
Review of performance in relation to the GWRDC's Annual Operational Plan, principal outputs & contributions to its outcome

REPORT OF OPERATIONS – RD&E

REPORT OF OPERATIONS

GWRDC works to achieve one outcome – the generation of new information that enhances the profitability, international competitiveness and sustainability of the Australian wine sector through investment in research, development and extension.

GWRDC achieves this outcome through investments in five program areas:

- > Program 1: **Market and consumer understanding** contributes to international competitiveness.
- > Program 2: **Winemaking excellence** contributes to profitability.
- > Program 3: **Grapes for purpose** contributes to profitability.
- > Program 4: **Sustainability of industry, environments and communities** contributes to sustainability.
- > Program 5: **Smart science, practical solutions** contributes to profitability, international competitiveness and sustainability.

How well GWRDC achieved this outcome in 2010–11, based on the strategies and measures of success in the *Annual Operational Plan 2010–11* (AOP), is discussed below.

Program 1: Market and consumer understanding

Investments in Program 1 generate information that helps the sector target wine styles and products more effectively and respond to market threats and opportunities better, with the goal of improved competitiveness in a challenging global environment.

Research during 2010–11 sought to improve the sector's understanding of domestic and export markets and consumer preferences for wine

by providing better understanding of sensory and non-sensory characteristics of wine that appeal to different segments of consumers. Research focused on particular consumer flavour preferences, consumer perceptions of and purchasing decisions around trust mark claims, and the influence of social networking on wine purchasing decisions. These research projects will continue next year and two new projects will look

at Chardonnay and at the influence of exposure on wine preferences.

The sector's understanding of key export and domestic wine markets and related trade and technical barriers was also enhanced. Australia is an active participant in the International Organisation of Vine and Wine (OIV) and GWRDC supports the 1st Vice President's participation in OIV fora. Investments through AWRI

and other research providers meant that Australia had the capacity to respond to any technical and regulatory issues and market access was maintained. Data on the grape and wine sector are collected by ABS and analysed by ABARES and are freely available to the sector.

Subprogram 1a: Know your consumer

Investment for 2010–11: \$1.90 million

Performance 2010–11

Objective	Strategies	Targets	Achievements
<p>Ensure that Australian wines are the preferred choice of consumers across a range of styles available in domestic and export markets</p>	<p>Identify both sensory and non-sensory characteristics of finished wine that may influence consumer preference in particular market segments.</p>	<p>Determination of key sensory and/or non-sensory consumer preference attributes in at least two key markets or market segments.</p>	<p>A new method has been developed and is being tested at five wine shows to collect consumer flavour preference data.</p> <p>In-field trials are scheduled to better understand consumer perceptions of trust mark claims for Australian wines.</p> <p>The sector is developing a better understanding of the influence of social networking on wine purchasing decisions.</p>
	<p>Develop new or enhance existing qualitative and quantitative methods for assessing and measuring sensory and non-sensory consumer preferences.</p>	<p>Implementation of new or enhanced methods for assessing sensory and/or non-sensory attributes into a range of existing and new consumer preference research programs.</p>	<p>Wine marketers have a better understanding of the decision influencers along the wine sector supply chain in Australia, China and the USA, and how these differ between on-premise and off-premise businesses, and high- and low-margin distribution businesses.</p>

Subprogram 1b: Market opportunities and development

Investment for 2010–11: \$0.901 million

Performance 2010–11

Objectives	Strategies	Targets	Achievements
Build wine market intelligence	Continue to collect and disseminate sector-relevant data in a coordinated and resource-efficient manner.	Demonstrable use by and support of the sector for the information collected.	<p><i>Australian wine grape production projections to 2012–13</i>, published by ABARES for 23 wine grape producing zones and 18 varieties. Available from www.abares.gov.au.</p> <p><i>Global wine markets 1961–2009: A statistical compendium</i>, published by and available in PDF (free) or paperback (\$35) from University of Adelaide Publishing.</p> <p><i>Australian Wine and Grape Industry, 2010 and Vineyards Estimates Australia 2009–10</i> available from www.abs.gov.au.</p>
Understand and comply with trade-related technical and regulatory requirements.	Collaborate with other sector bodies to support the identification and quantification of the impact of current and potential new trade barriers.	No reduction in market access for Australian wines through technical or regulatory issues.	<p>Commenced benchmarking of phosphorous acid (PA) residues in wines produced in a number of countries to provide a factual basis to support establishing a maximum residue limit (MRL) for PA.</p> <p>Support for 1st Vice President OIV (International Organisation of Vine and Wine) to attend OIV's international meetings and conferences.</p> <p>Better understanding of the costs to the wine sector of trade barriers.</p>
	Maintain a response capacity to technical and regulatory issues as they arise.	No reduction in market access through technical or regulatory issues.	Response capacity was maintained within the AWRI and other research providers, and there was no reduction in market access for Australian wines.

Completed final reports from Program 1 (copies are available from the GWRDC website)

RT 06/05-2	Effects on grape and wine quality of bunch thinning of Merlot under Queensland conditions
CSL 05/01	Winery wastewater: Research to practice
RT 07/02-4	A strategic review: The first step in establishing low-input viticulture regimes rationalising powdery mildew control in Riverland vineyards
RT 06/04-1	Improved frost management in the Goulburn/Yarra Valleys and Strathbogie Ranges
RT 07/04-1	Investigating the effects of polyacrylamide in a commercial scale trial
RT 07/02-1	Reducing evaporation and efficient water harvesting: Demonstration of evaporation control and benchmarking of vineyard catchments
RT 04/07-2	Improved management of garden weevil in WA: A warning service and assessing exclusion bands
RT 07/03-2	Making the most of moisture in the Eden Valley
RT 06/05-3	Speaking of grapes and wine: Common language between wineries and grape growers (video)
RI 0901	Competitor analysis: China

Program 2: Winemaking excellence

Investments in winemaking excellence seek to provide winemakers with the knowledge and tools they need to produce and deliver wines that consumers appreciate.

In 2010–11, investments in this program led to a greater understanding of wine chemistry, microbiology and winery processes so that new opportunities for wines that satisfy consumer demands

can be grasped and efficiencies in wine processing can be realised. The development of improved yeast strains and technical processes, and the reduction of wine faults, taints and spoilage, as well as more fundamental understanding of the chemical basis of wine flavour, aroma, colour and mouthfeel were key outcomes of research.

The capability to produce wines to meet consumer preferences

while using efficient processes will continue to be critical to the profitability of the wine sector. In 2011–12, GWRDC will continue to invest in the R&D of new yeast and bacterial strains with diverse fermentation capacity, including lower ethanol production. We will also invest to understand the target compounds responsible for mouthfeel, bitterness and astringency perception, varietal and bottle-aged wine flavour and

sulphidic off-flavours. Improved process efficiency, particularly for protein stabilisation, the development of new measurement tools based on nanotechnology and fibre optics, and ongoing technical troubleshooting will also be supported.

Subprogram 2a: Production technologies

Investment for 2010–11: \$5.312 million

Performance 2010–11

Objectives	Strategies	Targets	Achievements
<p>Support the development of novel and improved winemaking processes.</p> <p>Provide winemakers with the knowledge and capability to respond to changing consumer demands.</p>	<p>Continue to support research to improve fermentation efficiency through the generation of new yeast strains and other microbiological species with improved characteristics to:</p> <ul style="list-style-type: none"> > reduce the incidence of problem or 'stuck' fermentations > enhance flavour and aroma profiles in accordance with consumer preferences, and > produce lower levels of ethanol. 	<p>The outcomes from winemaking trials using new hybrid yeasts generated through selective breeding/adaptive evolution techniques are available.</p> <p>Progress is achieved on the development of commercial yeast strains that produce lower levels of alcohol during fermentation.</p> <p>New knowledge is available on the biology of <i>Oenococcus</i> spp. bacteria used in secondary malolactic fermentation (MLF) that could beneficially impact the sensory properties of finished wine.</p>	<p>Wines that had been made on a commercial scale from new hybrid yeasts developed previously through this program were showcased in a workshop at the 14th Australian Wine Industry Technical Conference (AWITC).</p> <p>Adaptive evolution to produce strains with different flavour profiles is progressing well. Some 175 new strains have been screened, and several taken on to the pilot scale fermentation assessment step.</p> <p>Two new hybrids that make less acetic acid have also passed the proof-of-concept stage.</p> <p>Conventional breeding approaches targeting yeast metabolism of glucose has led to new strains with very modest reductions in ethanol production (e.g. ethanol levels reduced by 0.3%). A systems biology approach is now being used to identify other genes that could be better targets for reducing ethanol production.</p> <p>Research outcomes developed through this program enabled a very successful MLF workshop to be held at the 14th AWITC. An update was provided on how to use MLF to influence the fruity characters of wines, and wines were available for tasting to demonstrate the ability of different malolactic bacterial strains to enhance red berry fruity characters following MLF.</p> <p>A breakthrough has also been made in understanding the biochemistry behind how <i>O. oeni</i> produces fruity ethyl esters during MLF and winemaking.</p>

Performance 2010–11

Objectives	Strategies	Targets	Achievements
	Determine significant factors affecting wine composition, flavour and aroma properties by maintaining investments in tannins research based on identified knowledge gaps and contemporary industry needs.	<p>Publish new knowledge on the drivers of phenolic tastes in white wines.</p> <p>Initiate at least two new R&D projects to improve the sector's knowledge on wine composition and target compounds that can influence sensory attributes in wine, in particular:</p> <ul style="list-style-type: none"> > the relationship between tannin chemistry and mouthfeel in red wine, and > opportunities to manipulate the flavonoid pathway to produce better wine sensory outcomes. 	<p>Further progress has been made on the drivers of phenolic taste in wine. While it is clear that wine phenolic compounds contribute to this attribute, the pH and acidity are also significant drivers of astringency in white wines.</p> <p>This information was presented to a highly successful workshop on white wine phenolics at the 14th AWITC. The workshop also indicated a shift away from a general opinion, held until just a few years ago, that phenolics in white wines can interfere with expression of fresh varietal characters.</p> <p>New investments have been made to:</p> <ul style="list-style-type: none"> > understand the flavonoid biosynthetic pathway in grapes, with the aim of improving the tannin composition of grapes and wines through manipulation of this pathway, and > understand tannin structure and function relationships as a foundation for understating mouthfeel perception in wines.

Subprogram 2b: Managing and enhancing wine attributes and composition

Investment for 2010–11: \$2.50 million

Performance 2010–11

Objectives	Strategies	Targets	Achievements
Enhance the quality of Australian wines at all price points.	Investigate novel analytical techniques to measure important grape and wine quality parameters in the vineyard or in wineries.	<p>Outcomes are available from trials evaluating a new analytical tool to assess optimum berry ripeness and grape composition in the vineyard.</p> <p>Commissioning of at least one new project to evaluate specific grape or wine attributes utilising new analytical approaches.</p>	<p>A new technology, attenuated total reflection – mid infrared (ATR-MIR), using portable instruments has been assessed for whole berries and shows promise. On-harvester applications have also been evaluated.</p> <p>A new investment was made to develop in-situ optical fibre sensors.</p>

Performance 2010–11

Objectives	Strategies	Targets	Achievements
Ensure that Australian wine continues to meet the most rigorous consumer and market standards.	Explore novel technical solutions and treatment options to avoid or reduce the occurrence of faults and spoilage.	<p>Generation and dissemination of results from protein stability and removal studies, using enzyme treatments, novel adsorbents and alternative fining agents.</p> <p>Availability of improved analytical methods to detect and quantify important compounds implicated in bushfire smoke taint in grapes and wine.</p>	<p>Data on the use of the alternative absorbents zirconium dioxide and surface-modified silicas have been published and were also presented at a workshop at the 14th AWITC. Pilot-scale trials with enzymes and heat treatment were undertaken during the 2011 vintage.</p> <p>The various precursor compounds for smoke taint in wines have been synthesised for use as standards in the analysis of the potential for smoke taint in grapes and wine. This means that methods are now available to detect both the impact odorants and their precursors.</p>
Maintain wine quality during transport and storage.	Invest in research to understand and quantify variables associated with the maintenance of wine quality during transport and storage.	<p>Release of new knowledge to the sector on ways to reduce transport- and storage-related spoilage issues.</p> <p>Availability of practical information on the impact of glass colour and thickness on the degradation of white wines post-bottling.</p>	Data on the impact of thickness and colour of glass in wine bottles on the degradation of colour (browning) in white wines have been published.

Completed final reports from Program 2 (copies are available from the GWRDC website)

DPI 06/05	Review of and packaging of current viticultural nutritional management information for Australia's major wine grape varieties
MU LTU 04/01	Pesticide effects on beneficials: Strategies for returning vineyards to mealybug levels below the economic threshold
CSP 06/05	Grape composition and wine quality from salt-excluding rootstocks and characterisation of the chloride exclusion mechanism
SAR 00/7	To develop monitoring protocols for vineyard irrigation with effluent water by determining the effects of effluent irrigation on vine performance and soil properties
RD 05/01-1	Management of Botrytis and other bunch rots by: (a) Identification of other bunch rot fungi producing PPOs, and (b) Clarification of registered chemical against non-Botrytis bunch rots identified as potential bunch rot pathogens
SAR 04/02	Soil management for yield and quality
CSP 05/01	Optimising canopy function to increase yield while maintaining wine aroma, flavour and colour with decreased inputs
CSP 05/02	Optimising irrigation for different cultivars
CSP 06/03	Optimising irrigation and response to abiotic stress through development of biochemical, physiological and molecular markers of vine performance
USA 0902	Increase of the heat stability of white wine by surface engineered silica (SES)
CSU 03/02	Chemistry of sulfur dioxide and ascorbic acid as an antioxidant system in white wine
UM 0902	Wine bottle colour and oxidative spoilage

Program 3: Grapes for purpose

The investments under this Program continue to focus on understanding how to grow grapes to achieve wine quality specifications while maintaining or improving sustainability. The activities include fundamental research into grapevine and rootstock genetics, breeding grapevines for fungal resistance and rootstocks for salt tolerance, and understanding the links between sugar ripeness and grape flavour, and between grape

chemistry and biochemistry and wine flavour, colour, mouthfeel and quality.

The capability to produce fruit with the attributes winemakers need to make wines that meet consumer demands, using management techniques that are economically viable, environmentally responsible and adaptable to a changing climate, remain critical to the continuing profitability of the wine sector. GWRDC will continue to

support research into grapevine and rootstock genetics and breeding to deliver improved material for growers. These are longer-term initiatives that use molecular tools to inform and accelerate the conventional breeding process without necessarily resulting in genetically modified plants. GWRDC will also invest in developing standardised methods for varietal identification, and will continue to understand

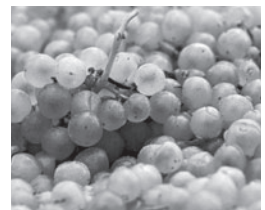
the link between grape genetics and biochemistry and grape and wine acidity, flavour, colour and mouthfeel. There will also be a particular focus on understanding how sugar and flavour accumulation in grapes are linked, with the aim of understanding whether it is possible to break this nexus and produce flavour-ripe grapes at lower sugar levels and potentially lower alcohol levels.

Subprogram 3a: Vine improvement and performance

Investment for 2010–11: \$1.359 million

Performance 2010–11

Objectives	Strategies	Targets	Achievements
Optimise vineyard inputs and costs to the targeted end-use of grapes.	Support WRAA initiatives to implement enhanced tools to help growers and winemakers assess the economic viability of their businesses.	Knowledge generated by GWRDC investments incorporated into tools used by the sector to quantify business viability.	<p>'Vinebiz', a software tool developed through previous investments by the GWRDC, was promoted by WGGA to growers.</p> <p>Extension materials generated from a range of GWRDC projects were presented to regional stakeholders around the country through Innovators' Network and Regional Program workshops.</p>



Performance 2010–11

Objectives	Strategies	Targets	Achievements
<p>Optimise the characterisation, selection and testing of grapevine germplasm.</p>	<p>Maintain support for the development of grapevine germplasm according to the sector's needs.</p>	<p>Progress on fundamental grapevine genetics studies to improve the understanding of links between specific genes and key traits for varietal improvement purposes.</p> <p>Investment in the development of a sector-supported quality accreditation system for grapevine material.</p>	<p>Fundamental grapevine genetic studies have allowed the development of high-throughput markers and a fast glasshouse breeding strategy. This has resulted in a large number of selective crosses being made and a large amount of seed being obtained and used for the germination of seedlings.</p> <p>Over 8000 seedlings have been germinated and screened, and individual plants selected, based on DNA marker analysis as mildew-resistant, fertile and suitable for assessment in the field. Assessment will be based on a number of traits associated with plant performance and berry attributes.</p> <p>As a consequence of these activities, over 1000 selections have been planted in the field for evaluation.</p> <p>A new investment was made to determine a best-practice methodology for varietal identification of planting material.</p>
<p>Develop a smarter approach to breeding and developing grapevine rootstocks.</p>	<p>Continue investment in projects to develop grapevine rootstocks that are better able to address emerging issues.</p>	<p>Progress towards the commercial release of hybrid rootstocks adapted to warmer growing conditions.</p> <p>Results emerging from rootstock breeding programs and field performance trials of salt-excluding rootstocks.</p> <p>Progress on research to identify genetic markers for the rapid screening and selection of salt-tolerant vine material.</p>	<p>Analysis of existing hybrid screening data has provided new information on the inheritance of key characteristics and identified new, promising selections for further evaluation.</p> <p>Rootstock field trials have been initiated at two sites to examine the performance of 55 new genotypes selected on the traits of high rootstrike, nematode resistance, vigour potential, low-to-moderate potassium transport, and good drought tolerance. Approximately 300 promising drought-tolerant genotypes have been identified for further study.</p> <p>Data have been collected on the effects of salt-excluding rootstock on yield and vegetative growth across three regions. Several presentations have been made through the Regional Program and at the 14th AWITC.</p> <p>Experiments are in progress to correlate chloride uptake and gene expression. This is a prerequisite to identifying markers for use in rapid screening.</p>

Subprogram 3b: Berry composition

Investment for 2010–11: \$2.0 million

Performance 2010–11

Objective	Strategy	Targets	Achievements
Produce fruit of known and desirable composition.	Support the development and application of novel techniques to understand and manage grape compositional characteristics that lead to desirable wine outcomes.	<p>One new project initiated to further the understanding of berry acid metabolism under higher growing temperature regimes.</p> <p>Results available from initial studies on the impact of plant growth regulators (PGRs) to manipulate the timing and synchronicity of the ripening process.</p> <p>One new study initiated to better understand and manage the nexus between sugar ripeness and flavour ripeness using PGRs.</p>	<p>We invested in a new project on organic acid metabolism and the control of grape berry acidity in a warming climate.</p> <p>Data on the impact of PGRs on the ripening of grapes were published. PGRs were applied prior to the initiation of ripening and significantly delayed sugar and colour accumulation.</p> <p>Initial sensory analysis of wines made from grapes treated or not treated with PGRs suggested that PGRs delayed both sugar and flavour ripeness. In other words, the nexus appears to be strong at the macro level.</p> <p>Studies to determine flavour compound and precursor levels during ripening and further sensory analysis of wines have been initiated.</p>

Completed final reports from Program 3 (copies are available from the GWRDC website)

CSP 06/01	Development of a rapid genetic system for linking traits to genes
CSP 06/06	Manipulating ripening and berry quality through the hormonal control of grape berry development
UA 05/05	Overcoming inefficient utilisation of fructose as a cause of problem fermentations
DPI 05/01	Viticultural management of grape tannin and anthocyanin levels to achieve desired wine quality specifications
CSP 06/02	Optimising colour and tannin composition of grapes and wine

Program 4: Sustainability of industry, environments and communities

The environmental sustainability of individual businesses and the sector as a whole was supported through the dissemination of research results to help sector participants reduce their environmental footprints and adopt sustainable practices. We also continued to invest in fostering the next generation of leaders through leadership programs and student scholarships, as well as supporting travel scholarships in Program 5.

To help identify the key researchable questions for our new five-year Strategic Plan, graduates of the Future Leaders Program and the Australian Rural Leadership Program (ARLP) were one of the key sector groups with whom we consulted.

In 2011–12, GWRDC will continue collaborating with other agricultural commodity groups (in grains and horticulture in particular) to address priority cross-sector

topics including climate change, spray drift, soil health and quality. We are also building on research undertaken in other sectors through an initiative to develop a soil quality benchmarking framework for viticulture. A project specifically focused on identifying robust and reliable soil biology indicators will support the national benchmarking initiative.

GWRDC is looking at new ways to enhance the skills of PhD

scholarship holders and graduates of the Future Leaders Program and the ARLP. Over the next 12 months, scholarship holders will be given the opportunity to develop their networks and communication skills, while the alumni from the Future Leaders program and the ARLP will be given the opportunity to undertake additional training in corporate governance and participation in a mentoring program.

Subprogram 4a: Sustainable production

Investment for 2010–11: \$2.825 million

Performance 2010–11

Objectives	Strategies	Targets	Achievements
Further develop and maximise the adoption of vine health and integrated pest management practices.	Develop materials and run regional workshops to disseminate the latest information on dealing with vine health and pest management issues.	Increased grapegrower awareness of vine health and pest management issues through attendance at a series of regional workshops.	Pest & Disease question and answer factsheets and Pest & Disease debrief sessions developed and delivered across 3 states to over 350 attendees.
Ensure the long-term viability and sustainability of sector practices.	Disseminate knowledge in the areas of water application efficiency, vine stress and soil health.	Increased grapegrower awareness of water use efficiency (including the use of recycled water) vine stress and soil health through field days, print media and other extension activities.	A series of workshops were run in WA addressing the severe drought experienced in the 2010–11 growing season across that state. Research on vine recovery from drought is generating valuable results for how growers might rotationally irrigate their blocks under restricted water allocations caused by drought.

Subprogram 4b: Environmental custodians

Investment for 2010–11: \$0.863 million

Performance 2010–11

Objectives	Strategies	Targets	Achievements
<p>Allow the Australian wine sector to build and utilise its reputation as an internationally recognised environmental custodian as a competitive advantage.</p>	<p>Provide support for tools and programs that reduce the environmental footprint of the sector and help demonstrate the footprint of the wine supply chain.</p>	<p>Improved awareness and participation of grapegrowers and wineries in credible environmental initiatives within the wine industry such as Entwine.</p>	<p>Online resource kit and printed winery wastewater materials developed, launched and being utilised by the wine industry.</p> <p><i>Improving Winery Refrigeration Efficiency</i> booklet released.</p>
<p>Define the opportunities and adapt to the challenges of climate change.</p>	<p>Generate knowledge to help cope with extreme weather events and other impacts of climate change.</p> <p>Establish wine sector climate change research programs, including adaptation options.</p>	<p>Progress within projects that address implications and adaptation to climate change and variability and dissemination of this to sector.</p>	<p>DAFF climate change research program is progressing well in the areas of understanding the impacts of temperature elevation, and evaluating planting material suited to hotter, drier conditions.</p> <p>Germplasm with the ability to withstand hot and dry conditions as well as retain desirable winemaking properties has been identified from these projects.</p>

Subprogram 4c: Looking ahead

Investment for 2010–11: \$0.324 million

Performance 2010–11

Objective	Strategy	Targets	Achievements
<p>Ensure that the sector can proactively meet and minimise the impact of biosecurity and other threats.</p>	<p>Generation of additional knowledge to improve the sector's capacity to combat biosecurity threats and to manage incursions.</p>	<p>Latest knowledge disseminated to industry.</p>	<p>Phylloxera protocols were updated and disseminated to the sector.</p> <p>A biosecurity technical reference group that meets on an as-needs basis did not have a reason to meet during the year.</p>

Subprogram 4d: The next generation

Investment for 2010–11: \$0.689 million

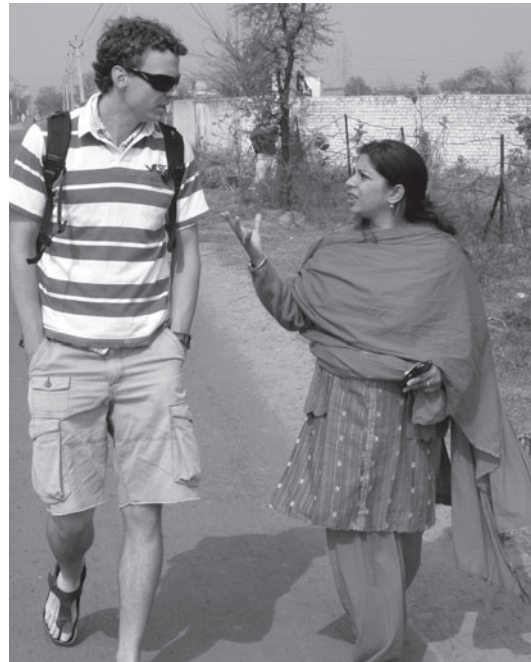
Performance 2010–11

Objective	Strategy	Targets	Achievements
<p>Facilitate the training of the next generation of research and grape and wine sector leaders.</p>	<p>Attract high-calibre candidates to undertake relevant leadership, Honours and PhD studies.</p>	<p>Funding of at least 30 people to undertake relevant leadership, Honours or PhD studies, as well as tracking their career paths after completion of a GWRDC-sponsored course or scholarship.</p>	<p>GWRDC scholarships were awarded to 10 PhD candidates, 19 scholarship holders continued their PhD studies and 1 scholarship holder had her PhD conferred.</p> <p>Four Honours scholarships were awarded for studies commencing in 2010–11 and four scholarship holders had their Honours degrees conferred during 2010–11.</p> <p>There are now 60 Future Leaders Program alumni after 15 high-calibre participants completed the 4th program.</p> <p>Dr Troy Fischer, the GWRDC-sponsored candidate in the ARLP's course 16, graduated.</p>

Completed final reports from Program 4

(copies are available from the GWRDC website)

UA 08/01	Identification of salt-accumulating organisms from winery wastewater
GWR 0918	Soil health review
GWR 1005	Review of GWRDC's leadership investments
WFA 06/01	Leadership development in the wine industry (Future Leaders)



A component of the ARLP involves an overseas study tour and, as part of course 16, 33 candidates went to India. The overseas trip is designed to take candidates out of their comfort zone, expose them to the real-world challenges of emerging economies and to examples of leadership in practice to answer those challenges.

Here GWRDC-sponsored candidate Troy Fischer and Ms Ujala Bedi of the Navjyoti Foundation near Delhi discuss the programs the Navjyoti Foundation is running to overcome the challenges of educating and up skilling the poor in India.

Program 5: Smart science, practical solutions

The GWRDC website (www.gwrdc.gov.au) now has an archive of more than 800 completed projects available in an easy-to-search and download format. We continued to make research results available to our stakeholders through our major national extension initiatives,

the Regional Program and the Innovators' Network. We also invested in extension work through our research providers, principally the AWRI and the NWGIC. More than 400 people attended one of the 12 seminars and 6 workshops delivered by AWRI in WA, SA, Victoria and NSW. More than

330 people attended one of NWGIC's 11 Spring Vine Health Field Days that were held in NSW, WA, Victoria, Queensland and the ACT.

In 2011–12, we aim to increase participation in the Regional Program and Innovators' Network extension activities and to provide

more extension materials to the sector. We will continue improving our website's functionality and will investigate new ways of helping our stakeholders adopt the results of the R&D work that they fund.

Subprogram 5a: Knowledge development

Investment for 2010–11: \$0.606 million

Performance 2010–11

Objective	Strategies	Targets	Achievements
<p>Ensure that the full value of GWRDC's investments is realised by all relevant stakeholders.</p>	<p>Improve website functionality, linkages, content and end-user relevance.</p>	<p>Increased website visits within Australia.</p> <p>Improved content and sector usage, as measured through user survey and other feedback.</p>	<p>In 2010–11, there were 28,348 visits to the GWRDC website, a substantial increase on the 10,304 visits in the previous year.</p> <p>The website has been regularly updated to ensure content is timely and relevant.</p> <p>A user survey is planned for 2011–12.</p>
	<p>Perform cost–benefit analyses of completed projects.</p>	<p>Completed analyses demonstrate positive rates of return on R&D investment.</p>	<p>GWRDC's suite of leadership investments was reviewed for their perceived value and impact, to help guide future investment.</p> <p>An expert review of soil health information helped identify gaps in knowledge and opportunities for future collaborative investments.</p> <p>Through its membership of the Council of Rural Research and Development Corporations (CRRDC), GWRDC is investing in the development of a new and robust model for cost–benefit analysis.</p>

Subprogram 5b: Industry solutions

Investment for 2010–11: \$3.295 million

Performance 2010–11

Objective	Strategy	Targets	Achievements
Foster stronger links between research and the development of solutions for the sector.	Implement national rollout of the GWRDC's Innovators' Network and Regional Program in key winegrape growing regions throughout Australia.	Innovators' Network and Regional Program are viewed by Australian wine sector as key vehicles for extending R&D information to the sector.	More than 450 people participated in 8 Innovators' Network workshops in 2010–11. Some 537 subscribers receive the Innovators' Network e-newsletter. The 11 zones contracted through the Regional Program actively delivered extension and adoption projects in priority areas identified by their members.

Sub program 5c: Administration and governance

Investment for 2010–11: \$0.061 million

Performance 2010–11

Objective	Strategy	Targets	Achievements
Continuously improve the efficiency and effectiveness of GWRDC's administrative and governance procedures.	Review GWRDC operations.	Full compliance with all governance requirements.	Full compliance achieved.



Completed final reports from Program 5 (copies are available from the GWRDC website)

RT 08/03-2	Developing tools and demonstration sites that integrate biodiversity into vineyard production systems, promoting sustainability
RT 08/01-3	Phomopsis control in the Limestone Coast
RD 08/02-1	The role of eriophyid mites in yield decline in Cabernet Sauvignon in Western Australia
GWT 0909	Travel to 2010 International Cool Climate Symposium
GWT 0910	Attendance at the XV International Botrytis Symposium, Cádiz (Spain)
GWT 1002	Development of an oenological research program examining the effects of base wine temperature and choice of yeast on the secondary fermentation of Tasmania sparkling wine
GWR 0905	GWRDC Tannin Review
GWT 1005	Travel sponsorship to present at the Fifth International Phylloxera Symposium and the Joint 30th International ESN Symposium, Austria
GWT 1001	Participation in the International Workshop on Grapevine Downy and Powdery Mildew
GWT 1004	Attendance at IGGP, GBG and PGRS Meetings, USA, 2010
GWT 1006	Attendance at the Sensory and Consumer Science Conference, Spain
RT 08/03-4	Developing a downy mildew management decision webpage for Western Australian wine regions
GWT 1003	Attendance at the International Conference on Climate Change: Impacts and Responses, July 2010, Brisbane, Australia
GWT 0911	9th Wartburg Symposium on Flavor Chemistry & Biology, Eisenach, Germany
GWT 0912	9th Wartburg Symposium on Flavour Chemistry & Biology, Eisenach, Germany
GWT 1008	Attendance and presentation of a poster at the 18th Biennial Australasian Plant Pathology Society (APPS) Conference, concurrent with the 4th Asian Conference on Plant Pathology (ACPP), 26–29 April 2011, Darwin, NT



Spending on Rural Research & Development Priorities & National Research Priorities

The following table shows how the GWRDC's program structure links to the Australian Government's Rural Research and Development Priorities (RRDP) and National Research Priorities (NRP).

Table 1: How GWRDC's program structure links to the Australian Government's Rural Research and Development Priorities and National Research Priorities

GWRDC Programs	Rural Research and Development Priorities	National Research Priorities
<p>Market and consumer understanding</p> <p>Subprograms:</p> <ul style="list-style-type: none"> a) Know your consumer b) Market opportunities and development 	<p>Supply chains and markets</p> <p>Better understand and respond to domestic and international market and consumer requirements and improve the flow of such information through the whole of the supply chain, including to consumers</p>	<p>Promoting and maintaining good health</p> <p>Through strengthening Australia's social and economic fabric</p>
<p>Winemaking excellence</p> <p>Subprograms:</p> <ul style="list-style-type: none"> a) Production technologies b) Managing and enhancing wine attributes and composition 	<p>Productivity and adding value</p> <p>Improve the productivity and profitability of existing industries and support the development of viable new industries</p>	
<p>Grapes for purpose</p> <p>Subprograms:</p> <ul style="list-style-type: none"> a) Vine improvement and performance b) Berry composition 		
<p>Sustainability of industry, environments and communities</p> <p>Subprograms:</p> <ul style="list-style-type: none"> a) Sustainable production b) Environmental custodians 	<p>Natural resource management</p> <p>Support effective management of Australia's natural resources to ensure primary industries are both economically and environmentally sustainable</p> <p>Climate change and climate variability</p> <p>Build resilience to climate variability and adapt to and mitigate climate change</p>	<p>An environmentally sustainable Australia</p> <p>Transforming the way we utilise the land and water resources through a better understanding of human and environmental systems and the use of new technology</p>
<ul style="list-style-type: none"> c) Looking ahead 	<p>Biosecurity</p> <p>Protect Australia's community, primary industries and environment from biosecurity threats</p>	<p>Safeguarding Australia</p> <p>Protecting Australia from invasive diseases and pests</p>

GWRDC Programs	Rural Research and Development Priorities	National Research Priorities
d) The next generation	Supporting the Rural Research and Development Priorities	Frontier technologies for building and transforming Australian industries
Smart science, practical solutions	Innovation skills	Stimulating the growth of world-class Australian industries using innovative technologies
Subprograms:	Improve the skills to undertake research and apply its findings	
a) Knowledge development	Technology	
b) Industry solutions	Promote the development of new and existing technologies	
c) Administration and governance		

The following breakdown of expenditure indicates the amount of spending on projects within GWRDC research programs (including administrative expenses) that can be aligned to the Australian Government's Rural Research and Development Priorities (Table 2) and National Research Priorities (Table 3).

Table 2: Rural Research and Development Priorities

Rural R&D Priorities (RRDP)	Productivity and adding value	Supply chain and markets	Natural resource management	Climate variability and climate change	Biosecurity	Supporting the priorities		Total
						Innovation skills	Technology	
	\$000	\$000	\$000	\$000	\$000	\$000	\$000	\$000
Program 1: Market and consumer understanding		2,801						2,801
		12%						12%
Program 2: Winemaking excellence	7,812							7,812
	35%							35%
Program 3: Grapes for purpose	3,359							3,359
	15%							15%
Program 4: Sustainability of industry, environments and communities			1,650	2,040	324	689		4,703
			7%	9%	1%	3%		20%
Program 5: Smart science, practical solutions	55			178		434	3,295	3,962
	0%			1%		2%	15%	18%
TOTAL	11,226	2,801	1,650	2,218	324	1,123	3,295	22,637
	50%	12%	7%	10%	1%	5%	15%	100%

Table 3: National Research Priorities expenditure

National Research Priorities (NRP)	An environmentally sustainable Australia			Promoting and maintaining good health	Frontier technologies for building and transforming Australian industries	Safeguarding Australia	Total
	\$000			\$000	\$000	\$000	\$000
	A1	A5	A7	B4	C5	D3	
Program 1: Market and consumer understanding				2,801			2,801
				12%			12%
Program 2: Winemaking excellence				7,812			7,812
				35%			35%
Program 3: Grapes for purpose				3,359			3,359
				15%			15%
Program 4: Sustainability of industry, environments and communities	43	1,742	1,905		689	324	4,703
	0%	8%	8%		3%	1%	20%
Program 5: Smart science, practical solutions			178	15	3,769		3,962
			1%	0%	17%		18%
TOTAL	43	1,742	2,083	13,987	4,458	324	22,637
	0%	8%	9%	62%	20%	1%	100%

Legend to Table 3: Priority goals

- A1 Water – a critical resource
- A5 Sustainable use of Australia's biodiversity
- A7 Responding to climate change and variability
- B4 Strengthening Australia's social and economic fabric
- C5 Promoting an innovation culture and economy
- D3 Protecting Australia from invasive diseases and pests

Review of performance in relation to statutory objects & functions

Statutory objects

The GWRDC's statutory objects under Section 3 of the PIERD Act and details of performance assessment are set out below.

Statutory object	Performance assessment
Increasing the economic, environmental and social benefits to members of primary industries and to the community in general by improving the production, processing, storage, transport or marketing of the products of primary industries.	Delivered through the outputs from investments in programs 1–5. The review of these investments starts on page 20.
Achieving the sustainable use and sustainable management of natural resources.	Delivered through the outputs from investments in programs 1–5 and particularly program 4. The review of these investments starts on page 20.
Making more effective use of the resources and skills of the community in general and the scientific community in particular.	GWRDC has achieved this through its funding of RD&E activities (particularly those involving collaboration between researchers and with the sector) and its funding of capacity-building initiatives such as the Future Leaders Program, PhD and Honours scholarships and travel bursaries.
Improving accountability for expenditure upon research and development activities in relation to primary industries.	GWRDC achieved this through its reporting mechanisms to the Australian Government and its wine sector stakeholders.

Statutory functions

The GWRDC's statutory functions under Section 11 of the PIERD Act and details of performance assessment are set out below.

Statutory function	Performance assessment
<p>a) To investigate and evaluate the requirements for research and development in relation to the primary industry in respect of which it was established and, on the basis of such evaluation and investigation:</p> <ul style="list-style-type: none"> i. to prepare an R&D plan under section 19, and ii. to review and revise the plan, and 	During the period, the GWRDC reviewed its <i>Five Year R&D Plan 2007–2012</i> and determined that no variations in the R&D program areas were required.
b) to prepare an annual operational plan under section 25 for each financial year, and	The GWRDC's <i>Annual Operational Plan 2010–11</i> was approved by the Minister on 27 October 2010. There were no substantial revisions to the plan after it was approved.
c) to co-ordinate or fund the carrying out of R&D activities that are consistent with the annual operational plan prepared by the Corporation and in force at that time, and	Delivered through the outputs from investments in programs 1–5. The review of these investments starts on page 20.

Statutory function	Performance assessment
<p>d) to:</p> <ul style="list-style-type: none"> i. monitor ii. evaluate, and iii. report to the Parliament, the Minister and its representative organisations on R&D activities that are co-ordinated or funded, wholly or partly, by the Corporation, and 	<p>Research providers report twice yearly on their progress towards contracted research outcomes. Their reports are evaluated by GWRDC's R&D Program Managers, who report on the results of their evaluations to the Board.</p> <p>GWRDC reports to Parliament, the Minister and its representative organisations through its <i>Annual Report</i>.</p>
<p>e) to:</p> <ul style="list-style-type: none"> i. assess, and ii. report to Parliament, the Minister and its representative organisations on the impact, on the primary industry in respect of which the Corporation was established, of R&D activities that are co-ordinated or funded, wholly or partly, by the Corporation, and 	<p>Research providers detail the findings of their R&D in a final report to GWRDC. These reports are assessed by GWRDC's R&D Program Managers.</p> <p>GWRDC reports to Parliament, the Minister and its representative organisations through its <i>Annual Report</i>.</p>
<p>f) to facilitate the dissemination, adoption and commercialisation of the results of research and development in relation to the primary industry in respect of which the Corporation was established.</p>	<p>Delivered through the outputs from investments in programs 1–5 and particularly program 5.</p> <p>GWRDC communicates the results of R&D to its stakeholders through a number of communication channels, including face-to-face workshops, printed and electronic newsletters and website.</p> <p>The review of these investments starts on page 33.</p>



Review of performance in relation to key performance indicators

GWRDC achieved or exceeded its targets against its three key performance indicators in 2010–11.

Key performance indicators	2010–11 target	2010–11 outcome
Research and development projects are funded in line with the approved <i>Annual Operational Plan</i>	85%	85%
Increased number of Innovators' Network members	160	537
Maintain number of key regions participating in Regional Program	11	11

